SAMPLE COLLECTION PROTOCOLS AND ANALYTICAL METHODOLOGIES~~REQUIREMENTS~~

Purpose

The purpose of this appendix is to establish standard sample collection requirements and analytical methods and procedures for use in identifying and quantifying asbestos fibers in air, bulk material, and environmental media such as soil or ash.

Sample Collection Requirements

The following sample collection requirements shall be followed when collecting samples for the purpose of determining the applicability of Section 5.5, and when collecting samples necessary to comply with the requirements of Section 5.5:

Bulk Samples

Bulk samples shall be collected, in a manner sufficient to determine whether the material is asbestos-containing material (ACM) or not ACM, from each type of suspect ACM. Bulk samples shall be collected by a State of Colorado certified Asbestos Building Inspector. In the absence of bulk sample collection, any suspect ACMs must be assumed to be ACMs.

Bulk samples shall be collected by homogenous type based on color, pattern, texture, thickness, associated materials, or by other identifying characteristics. Additionally, the quantity and location of a suspect material shall be used to determine the number of bulk samples required to characterize the asbestos content of a given homogeneous material. For the purpose of determining that a homogeneous suspect material does not contain asbestos, a minimum of three bulk samples shall be collected from the homogeneous material unless there is insufficient material to constitute three samples.

Soil Samples

Samples collected to determine asbestos content in soil shall be 10 point aliquot composite samples collected from a maximum area of 1,250 square feet or a maximum volume of 40 cubic yards. Individual aliquots shall be approximately 1/10 of the entire sample volume. At each aliquot location approximately one tablespoon of soil shall be collected. The total volume of the 10 aliquots should equal roughly a half cup. The total collected sample volume should be greater than one quarter cup, but should not exceed one cup. Aliquot locations shall be randomly selected but shall be representative of the entire sample area or volume (to be inclusive of the interior of soil piles in addition to the surface). However, aliquots shall be co-located with any areas where friable ACM was formerly present.

Sampling for clearance purposes of surface conditions shall have the following additional requirements:

A) The aliquots of a clearance sample shall not be collected until after the RACS, and the required amount of associated material, has been removed.

B) A visual inspection shall be performed and passed (i.e., no visible ACM present) by a State of Colorado certified Asbestos Building Inspector prior to the collection of soil samples. Visual inspections shall include the following:

a. The area to be cleared shall be designated before the visual inspection; and,
b. Former locations of friable materials shall be designated; and,
c. The surface being inspected shall be dry enough to allow identification of suspect ACM; and,
d. The visual inspection shall be conducted in adequate lighting; and,
e. The area to be cleared shall be free of visual impediments (e.g. snow cover, plastic sheeting, standing water, etc.); and,
f. At a minimum the area to be cleared shall be inspected in at least two perpendicular directions; and,
g. Single or multiple inspectors may be used to perform a visual clearance. However, a single inspector shall visually inspect no more than a five foot width with each pass ~~(~~[i.e. for a clearance area that is 25' x 50' a single inspector would be required to make at least 5 passes in one direction (25' length) and at least 10 passes in the other direction (50' length)]~~)~~; and,
h. Detailed close examination of the area being cleared is required. The inspector(s) should use limited invasive inspection techniques, such as periodically sifting the surface being cleared and closely inspecting the disturbed area.

~~A)~~C) If sidewalls with 6" or greater of vertical height are present, independent 10 point aliquot composite samples shall be collected from each of the sidewalls and the floor of the excavation.

~~Response to initial positive – follow up negative problem~~

Ash Samples

Ash that contains suspect asbestos containing material and/or construction and demolition debris shall be considered to be RACS unless the ash is sampled, and analysis demonstrates that the ash is not RACS. Representative samples of each type of ash materials shall be sampled and analyzed in the same manner as soil (including area/volumetric limitations of sampling). Ash samples shall~~ould~~ be collected by homogenous strata, location, content of other surrounding material, or other observations indicating heterogeneity of the ash present. All samples collected to determine asbestos content shall be collected by a State of Colorado certified Asbestos Building Inspector. In the absence of suspect asbestos containing materials or construction and demolition debris in ash material may be treated as non-RACS.

Cross Contamination Prevention

All sample collection equipment shall be decontaminated in a manner sufficient to prevent cross contamination between individual samples or individual composite samples. Decontamination is not required between the collection of aliquots comprising a single composite sample.

Air Samples

Air samples shall be collected by drawing air through 0.8-micron (µm), 25-millimeter (mm), mixed cellulose ester (MCE) filters, using an open-faced cowl extension oriented face down at an angle of 45°. Sample flow rate shall be between 0.5-10~~2-5~~ liters per minute depending on the anticipated duration of sampling and the specified detection sensitivity. Air samples shall be collected at a height that is representative of the disturbance activity taking place. However, air samples shall be located at a height between 3' above the ground surface but not to exceed 20 feet above the ground surface. Air samples shall be collected by a State of Colorado trained and certified Air Monitoring Specialist.

Documentation

All of the following sampling and analytical documentation shall be maintained during a project and available for Department review upon request. This documentation need not be submitted to CDPHE unless requested or as required in a project specific plan.

1) Bulk, soil, and ash samples:
    a. Description of the material being sampled including friability
        i. For samples collected for characterization purposes also include an estimate of the quantity of visible suspected RACS present
        ii. For samples of ash, also include a brief description of the ash layer, and any associated identifiable debris
    b. Name of person collecting the sample(s)
    c. Date and time of sample collection
    d. Location of sample collection
    e. The boundary/limits that are represented by the collected sample
    f. Chain of custody documentation
    g. Laboratory analysis reports
    h. Log of characterized homogeneous bulk materials including material descriptions, photographic documentation, and asbestos content
2) Air samples:
    a. Name of person collecting the sample(s)
    b. Date and time(s) of sample collection
    c. Locations of air sample collection
    d. Any relocations of air samples
    e. A map, drawing, or diagram showing air sample locations (initial and relocations) in relation to the work area
    f. Chain of custody documentation
    g. Laboratory analysis reports
    h. Explanation of any air sample malfunctions and any voided air samples
    i. Air sample data (flow rates, time of sampling, volumes, calibration method, etc.)
    j. Wind speed measurements
    k. Prevailing wind directions
    l. Wind shut down events

m. Observations of visible emissions and responses

Analytical Requirements

The following analytical methods shall be used to evaluate the presence of asbestos and/or to determine asbestos content when analyzing samples for the purpose of determining the applicability of Section 5.5, and when analyzing samples collected in accordance with Section 5.5:

Bulk Samples

Samples of suspect asbestos-containing material shall be analyzed by polarized light microscopy (PLM), according to United States Environmental Protection Agency (USEPA) Method EPA/600/R-93/116 or equivalent method, to determine if any asbestos fibers are present. Analysis shall be conducted by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory.

Soil Samples and Ash Samples

Prior to preparation of a soil or ash sample, bulk materials shall be separated from the soil or ash sample for independent analysis ~~and reporting~~. Any bulk materials identified in a soil or ash sample that contain any amount of asbestos shall be reported as independent layers of the whole sample. The samples shall be adequately prepared (crushed and dried) to facilitate stereomicroscopic analysis by the laboratory. The goal of the preparation process should be to produce dried conglomerates of approximately one eighth inch (1/8") to one quarter inch (¼") size. Rock and/or stone material does not need to be crushed (this process is not intended to be homogenization). Soil and ash samples shall be analyzed by PLM according to USEPA Method EPA/600/R-93/116 to determine if any asbestos fibers are present. Analysis shall be conducted by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory. During the stereomicroscopic analysis (10X – 50X) of the soil/ash sample the analyst shall sift through the sample at a rate of approximately one tablespoon per minute. At the end of the stereomicroscopic analysis the sample shall be agitated or shaken as a final check for asbestos prior to the preparation of PLM grab mounts. At no time during the stereomicroscopic analysis shall a sub sample be collected, the entire sample shall be analyzed and the results reported. If no asbestos was identified by PLM after the initial stereomicroscopic examination, then three random grab mount preparations shall be analyzed by PLM to determine if ~~that~~ the sample is none detected for asbestos content. If any asbestos is found by the laboratory it shall be reported even in the absence of a second detection (i.e. there does not need to be a second detection to qualify a trace level of asbestos in the sample). Quantification of asbestos content shall be based on the entire sample volume, and be reported as such.

Air Samples Collected During BMP, PSRMP or SOP Implementation

Air samples submitted for Phase Contrast Microscopy (PCM) shall be analyzed by according to NIOSH Method 7400 by a laboratory showing successful participation in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) Program or individual(s) certified through the AIHA Asbestos Analysts Registry (AAR) Program.

Air samples submitted for Transmission Electron Microscopy (TEM), for which quantification of asbestos is desired, shall be prepared and analyzed according to the standard Asbestos Hazard Emergency Response Act (AHERA) method (AHERA; 40 CFR Part 763, Subpart E, Appendix A). All TEM analysis shall be performed by a NVLAP accredited laboratory. If a presence/absence analysis is desired, the analysis shall be performed using the AHERA method modified in the following manner:

- A minimum of two preparations shall be prepared and utilized for each sample
- Analysis shall be conducted on a minimum of four grid openings or until three or more structures are identified, whichever comes first
- Any structure (adhering to the AHERA counting rules) identified during analysis shall be reported
    - Identification of less than three structures shall be reported as present
    - Identification of three or greater structures shall be reported as detected

Any air sample analysis that results in a "cannot be read (CBR)" determination from the analyst, or a "not analyzed (NA) or rejected" due to loose debris or uneven loading, shall be evaluated by the AMS to determine if a cause of the CBR or NA can be ascertained. If it is determined that the CBR is a result of overloading from airborne emissions, then the AMS shall request that the sample be prepared, using an indirect preparation method, for TEM presence absence analysis.

~~Air Samples Collected During RBSMP Implementation~~

~~Samples collected during RBSMP implementation shall be collected and analyzed in accordance with Appendix 5B.~~

Deviation from this sampling and analysis appendix shall only be allowed upon consultation with, review by, and approval from, the Division.